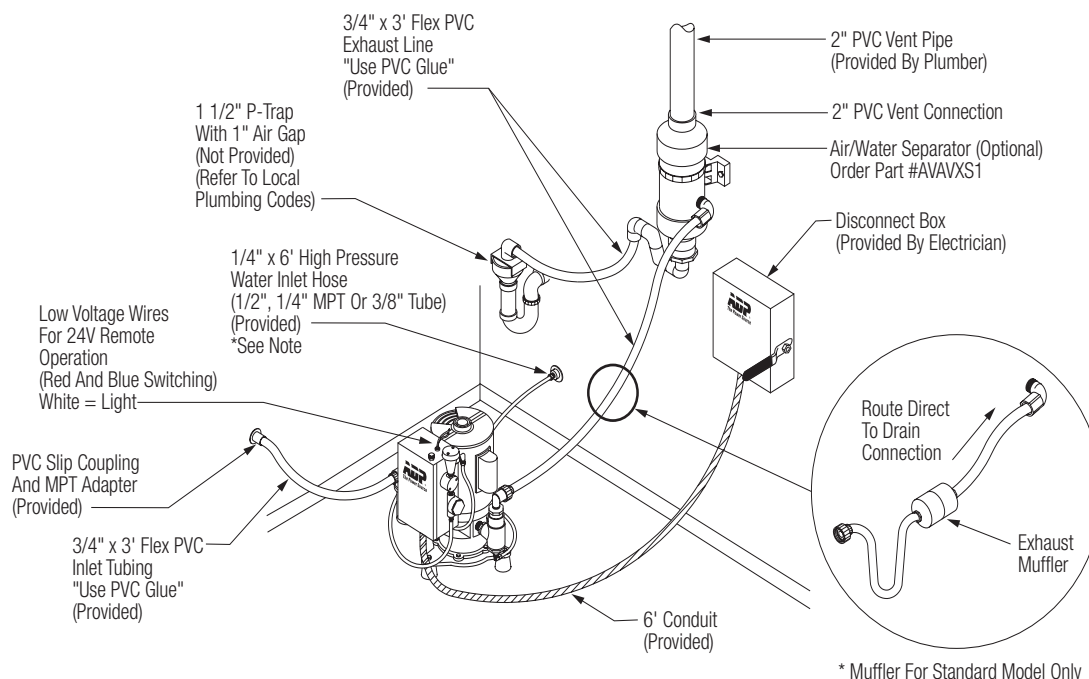


Installation & Operation

Single Vacuum System



NOTE: Some Local Codes Require A Reduced Pressure (RP) Backflow Preventor On The Incoming Water Line. (Not Provided)
MODEL SHOWN: AVU10SRX

Description:

Apollo Dental Products' Vacuum Systems have been tested and approved by various regulatory test agencies. The following list contains ADP File Numbers that may be helpful if questions arise regarding installation inspections.

Underwriter's Laboratories (UL) (cUL) File Number: MH13627
U.S. Food and Drug Administration (FDA) File Number: 2937927
City of Los Angeles Mechanical Test Labs File Number: M880066

This dental vacuum should only be installed by qualified personnel. Should any questions arise during the installation, call ADP Technical Support between the hours of 7:00 a.m. to 4:00 p.m. (Pacific Standard Time).

Unpacking The System:

Place the Vacuum System in a clean, dry, well ventilated area, on a solid, level surface. Consider sound level and insulate as needed. Be sure adequate ventilation is available as the Vacuum System is air-cooled. Ambient temperature in the equipment room should be within the temperature range of 40 degrees Fahrenheit (4° C) minimum and to 100 degrees Fahrenheit (38° C) maximum.

Do Not Allow The Vacuum To Freeze.

1. Remove the cardboard from the shipping platform.
2. Check to be sure that the pump is not damaged and that the Pump Installation Kit is in the box.
3. Remove the pump from the shipping platform.
4. Insert studded rubber shock mounts through the holes of the base plate and secure with the provided nuts.

Vacuum Pump Specifications:

Model	Max Users	Width	Depth	Height	Shipping Weight	Total HP	Volt	Amp Per Pump	Hz.	Wire Ga.	Breaker Size
AVG10S/AVU10S	3	13 In.	11 In.	15 In.	69 Lb.	1	115/208-230	16.2/8.1	60	12/14	30/20
AVG10SF/AVU10SF	3	33 Cm.	28 Cm.	38 Cm.	31 Kg.	1	220	8.1	50	14	20
AVB10S	2	13 In.	11 In.	15 In.	70 Lb.	1	115/208-230	16.2/8.1	60	12/14	30/20
AVB10SE	2	13 In.	10 In.	15 In.	66 Lb.	1	115/208-230	16.2/8.1	60	12/14	30/20
AVB10SF	2	33 Cm.	28 Cm.	38 Cm.	32 Kg.	1	220	8.1	50	14	20
AVB10SFE	2	33 Cm.	25 Cm.	38 Cm.	30 Kg.	1	220	8.1	50	14	20
AVG15S/AVU15S	4	13 In.	11 In.	17 In.	74 Lb.	1 1/2	115/208-230	22/11	60	10/12	40/20
AVG15SF/AVU15SF	4	33 Cm.	25 Cm.	43 Cm.	34 Kg.	1 1/2	220	11	50	12	20
AVB15S	3	13 In.	11 In.	17 In.	75 Lb.	1 1/2	115/208-230	22/11	60	10/12	40/20
AVB15SE	3	13 In.	11 In.	17 In.	71 Lb.	1 1/2	115/208-230	22/11	60	10/12	40/20
AVB15SF	3	33 Cm.	25 Cm.	38 Cm.	34 Kg.	1 1/2	220	11	50	12	20
AVB15SFE	3	33 Cm.	25 Cm.	38 Cm.	34 Kg.	1 1/2	220	11	50	12	20
AVB20S	4	13 In.	11 In.	18 In.	83 Lb.	2	208-230	12	60	12	20
AVB20SF	3	33 Cm.	25 Cm.	38 Cm.	38 Kg.	2	220	11	50	12	20
AVG20S/AVU20S	5	13 In.	11 In.	18 In.	85 Lb.	2	208-230	12	60	12	20
AVG20SF/AVU20SF	5	33 Cm.	28 Cm.	46 Cm.	39 Kg.	2	220	12	50	12	20
AVG30S/AVU30S	7	13 In.	11 In.	20 In.	89 Lb.	3	208-230	14	60	12	30
AVG30SF/AVU30SF	7	33 Cm.	28 Cm.	51 Cm.	40 Kg.	3	220	14	50	12	30

Models suffixed with “R” denotes Recycler

Models suffixed with “X” denotes Exhaust Separator

Example: Vacuum model **AVU10S** with recycler and separator will read as **AVU10SRX**.

Options: Most models can be ordered with recycler and/or exhaust separator, simply add suffix(es) “R” and “X”. Recycler models consume .19 GPM of water.

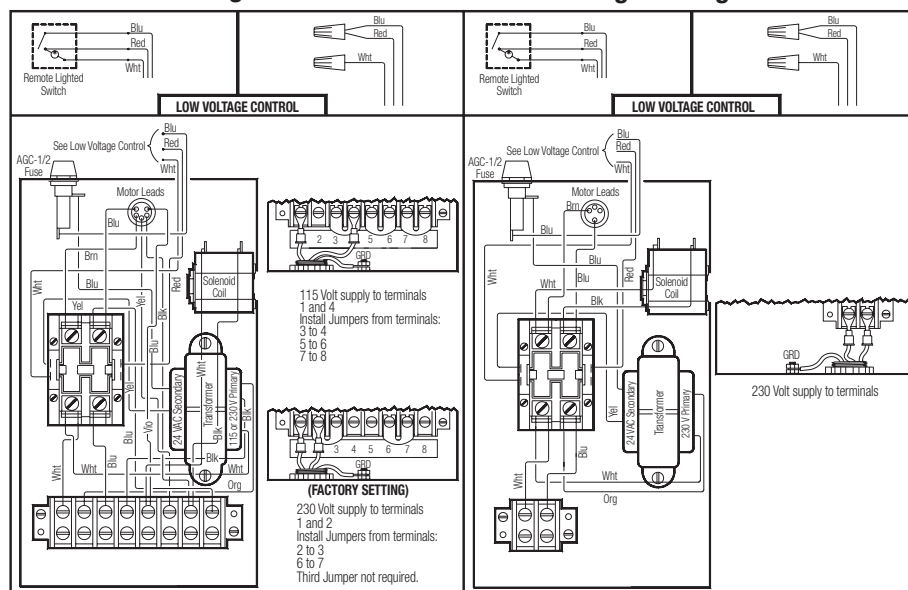
Notes: Vacuum dimensions do not include wall mounted air/water separator. A dedicated electrical circuit with circuit breaker must be provided for each vacuum pump. Ambient temperature must be within the range of 40 degrees Fahrenheit minimum (4° C) to 100 degrees Fahrenheit maximum (38° C).

“AVU” is UltraVac®
“AVG” is Gold Series™

“AVB” is Classic Bronze™
“F” denotes 50 Hz systems

Dual Voltage Models

Single Voltage Models



IMPORTANT: All vacuum systems are to be installed according to local plumbing and electrical codes. Never operate the equipment without complete and proper grounding.

A. Electrical Hook-Up Requirements:

Low Voltage Line (24V)

18-3 Thermostat wire from remote control switch if low voltage remote control switching is desired. **Red** and **Blue** wires are for switching, the **White** wire is for a lighted switch.

Line Voltage (60Hz.)

A single phase, 115 or 208-230 volt, 60Hz., supply circuit with approved ground connection is required. The 1 and 1 1/2 HP units are dual voltage 115/208-230 VAC. The 2 and 3 HP units are 230 volts only. **All units are factory wired for 208-230 volt operation:** 208-230 volt operation is recommended for maximum efficiency. An electrical hook-up kit, complete with high voltage switching box, and pre-wired conduit is provided.

Line Voltage (50Hz.)

A single phase, 220 volt, 50Hz., supply circuit with approved ground connection is required. **All units are factory wired for 220 volt operation:** 220 volt operation is recommended for maximum efficiency. An electrical hook-up kit, complete with high voltage switching box, and pre-wired conduit is provided.

B. Plumbing Hook-Up Requirements:

Water Line (Recommended)

1/2 inch (13 mm) cold water supply line with shut off valve terminating in 1/2 inch FPT. **The line must be flushed out prior to connection to vacuum.**

IMPORTANT: Water is essential for the operation and longevity of the pump. The supply must not be restricted or interrupted during operation. Water with high mineral content may cause mineral build-up and create water starvation, leading to seal failure. A water softener and filter are recommended for this situation.

Waste Line

Water and air exhaust to sewer line terminating in:

Option A - Floor sink, an exhaust separator is highly recommended for most installations.

Option B - P-trap adapted to 3/4 inch (19 mm) PVC slip connection. A 1 inch (25 mm) air gap may be required by local code.

Vacuum Line

3/4 inch (19 mm) PVC female slip connection. 2 and 3 HP models require a 1 inch (25 mm) PVC slip connection. Guidelines for the proper design of a vacuum piping system are given in the following sections.

IMPORTANT: Continuously running sinks or cuspidors must NEVER be connected to the vacuum piping system.

C. Vacuum Piping System Guidelines:

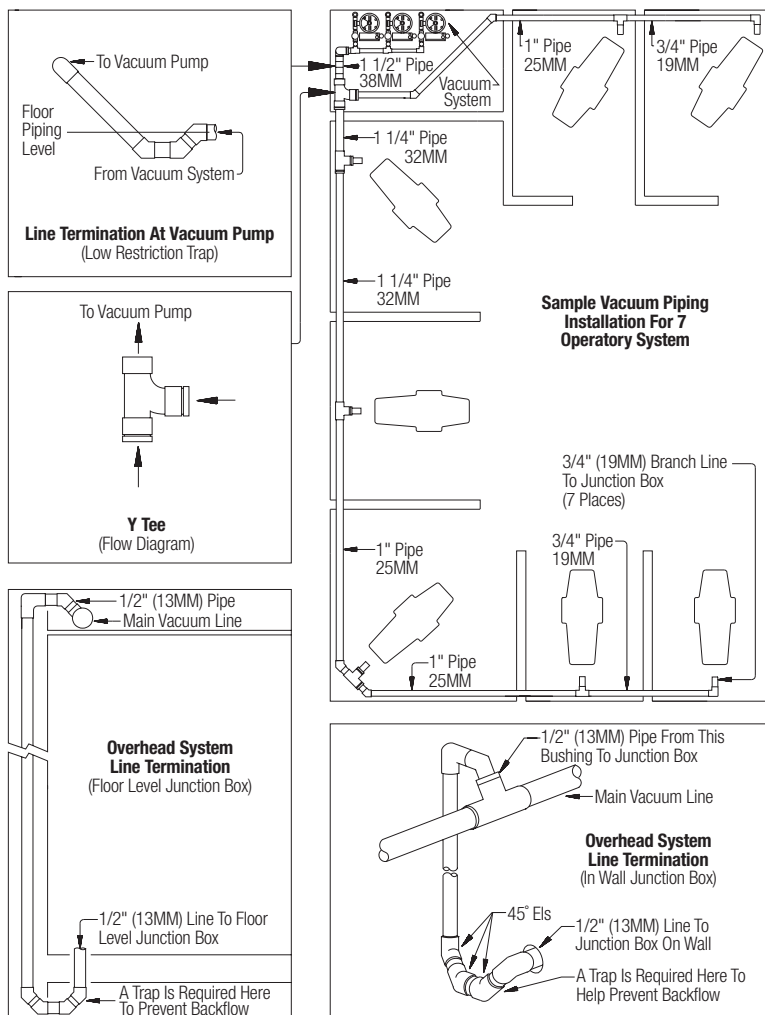
The design of the vacuum piping can have a large effect on the efficiency and reliability of a vacuum system. Experience has shown that the most effective vacuum piping designs are based on the air velocity that will occur in the lines. The velocity must be high enough to entrain all liquids and sediment in the air flow so that they do not accumulate in the lines. At the same time; the velocity must not be so high as to cause unacceptable vacuum losses. The **Vacuum Line Sizing Chart** on the following page is based on maintaining an optimum air flow velocity according to the criteria described above.

D. Vacuum Line Sizing Chart

Number Of Operatories Supplied Through Line	Pipe Diameter In Inches (Mm)
1	3/4" (19)
2	1" (25)
3	1" (25)
4	1 1/4" (32)
5	1 1/4" (32)
6	1 1/2" (38)
7	1 1/2" (38)
8	1 1/2" (38)

NOTE:

Use the number of operatories being supplied, not the number of outlets within the operatories to determine line size at any given point. Branch lines to individual operatories off of the main suction line should be 3/4 inch diameter.

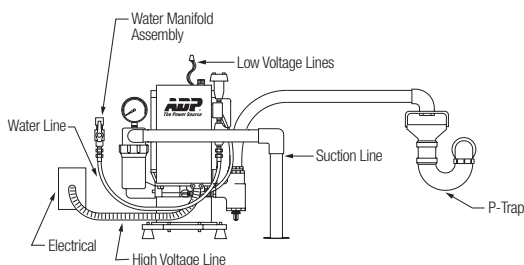


The vacuum lines should be supported to prevent sag and should be sloped 1/4 inch (6 mm) for every 10 feet (3 m) towards the vacuum pump.

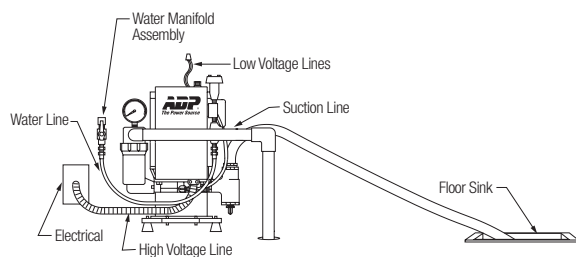
It is of primary importance to minimize 90 degree turns in the system. These will not only cause vacuum losses, but will also provide areas where sediment can accumulate. A combination of two 45 degree elbows are preferable to a 90 degree elbow. Restrictions in the line will also cause vacuum losses. Y-Tee fittings should be used whenever possible.

Overhead systems require the use of the next larger size vacuum pump. Overhead systems also require a 1/2 inch (13 mm) line rather than 3/4 inch (19 mm) from the operatories to the main line, and special provisions to ensure that liquids do not travel back into the operatories.

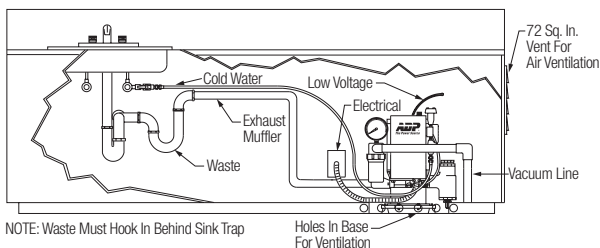
A sample vacuum piping diagram is shown. Consult ADP Technical Support for further information regarding vacuum line sizing.



P-Trap Installation



Floor Sink Installation



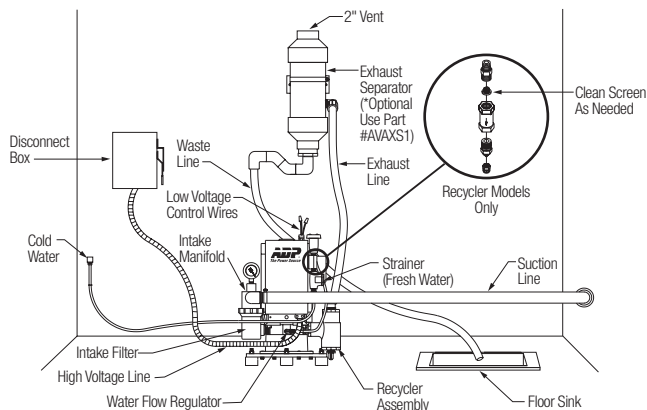
Cabinet Installation

E. Installing The Vacuum System

1. Place the vacuum unit on a solid level floor within two feet (0.6 m) of waste line P-trap or floor sink.
2. Connect operator vacuum line to the pump suction strainer using PVC pipe or the provided suction hose and glue with PVC type cement.
3. Attach 3/4 inch (19 mm) exhaust/drain hose, with the provided exhaust muffler, to P-trap or floor sink and glue with PVC type cement.
4. Connect brass water manifold with shut off valve, provided, to a 1/2 inch (13 mm) water supply line.

NOTE: It is recommended to purge at least 5 gallons of water through water line before attaching to vacuum. (Sediment in water lines of new buildings is common.)

5. Connect the high voltage electrical supply line to the pump as indicated in the electrical diagram.
6. For low voltage remote control, connect low voltage wires of corresponding color from the ADP Master Control Panel vacuum switch.



Typical Single Vacuum Installation With Exhaust Separator

F. Installing Vacuum System With Exhaust Separator

1. Place the vacuum unit on a solid level floor within two feet (0.6 m) of waste line P-trap or floor sink.
2. Mount the exhaust separator tank using sheetrock anchors and screws provided, at least 2 inch (51 mm) above a P-trap waste connection, and within 3 feet (1 m) of the vacuum exhaust for proper 3 foot (1 m) exhaust hose connections.
3. Connect operator vacuum line to the pump suction strainer using PVC pipe or the provided suction hose and glue with PVC type cement.
4. Attach the provided 3/4 inch (19 mm) pump exhaust hose to inlet fitting of the exhaust separator, and glue with PVC type cement.
5. Attach provided 3/4 inch (19 mm) drain hose to P-trap or floor sink from bottom drain fitting of exhaust separator and glue with PVC type cement.
6. Install 2 inch (51 mm) PVC vent line off the top of the exhaust separator and vent to the outdoors.
7. Connect the provided brass water manifold with shut-off valve to a 1/2 inch (13 mm) water supply line.
8. Connect high voltage electrical supply line to the pump as indicated in the electrical diagram.
9. For low voltage remote control, connect low voltage wires of corresponding color from the ADP Master Control Panel vacuum switch.

G. Initial Start-Up

1. Check that the water supply valve is "OPEN".
2. Start the pump.
3. Check exhaust tubing to ensure that water is flowing through the pumps.

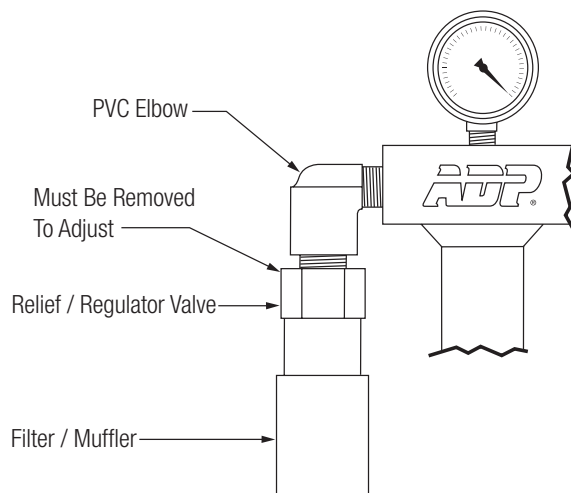
IMPORTANT: Do not run pump without full pressure water supply, or serious pump seal damage could result.

4. Check waste drain line to ensure that water is draining properly and that there are no water leaks.
5. Check vacuum gauge to ensure that the pump is functioning properly. Vacuum relief is factory preset for 10 inches Hg (34 KPa) Vacuum.
6. Store this installation manual for future reference.

H. Vacuum Level Adjustment

The Vacuum level is adjustable in the range of 8 to 13 inches Hg (27 to 44 KPa).

1. Remove the filter and valve from the PVC elbow.
2. Using a 1/4 inch nutdriver and a phillips screwdriver adjust the center mounted screw within the valve. Each full clockwise turn increases the vacuum level by approximately 2 inch Hg.



Maintenance Chart:

Maintenance Procedure	Daily	Weekly	Monthly	Semi-Annually	Annually
Cleanse Vacuum Piping System	•				
Clean Vacuum Pump Intake Filter		•			
Clean In-Operatory Strainers		•			
Check Vacuum Level			•		
Clean And Dust Off Vacuum Pump				•	
Replace Recycler Return Line					•
Clean or Replace Relief/Regulator Filter					•
Clean Water Inlet Strainer					•

Trouble-Shooting Guide

PROBLEM: Motor will not start when turned "ON".

Cause: No power to pump motor.

Remedy:

1. Check for proper voltage at pump terminal block input terminals (10% of rated voltage). If proper voltage is not present, check circuit breaker and supply circuit.
2. If low voltage switching is being used, bypass low voltage circuit by connecting the red and blue wires from the top of electrical box.
3. Check the voltage between the blue and white low voltage wires. If it is not between 20 and 28 VAC the fuse or the transformer may be defective, or there is a faulty connection within the box.
4. If the voltage of step 3 is within limits and relay contacts were not closing, replace relay.

PROBLEM: Pump runs but creates insufficient "suction".

Cause: Vacuum intake filter clogged.

Remedy:

1. Clean filter.

Cause: Faulty vacuum system.

Remedy:

1. Remove the vacuum inlet line from the pump. If there is good suction at the pump, but little to none in the system, the system is logged or contains leaks. Locate problem and repair.

Cause: Low relief/regulator valve setting.

Remedy:

1. Adjust as illustrated in vacuum adjustment section.

Cause: Inadequate water supply.

Remedy:

1. Make sure water supply valve to pump is fully "OPEN"
2. Unscrew hex cap from water inlet strainer and check for clogged filter screen. Clean as required.
3. Check for proper voltage at water solenoid coil (115 VAC 10%). If proper voltage exists replace water solenoid, (230 VAC 10% on all two and three horsepower models).
4. Check water regulator to see if it is plugged.

Cause: Inadequate sized pump.

Remedy:

1. Check usage chart for maximum number of simultaneous users. Upgrade if necessary.

PROBLEM: Pump runs but creates excessive vacuum.

Cause: Clogged vacuum relief filter.

Remedy:

1. Unscrew filter/muffler from valve. Clean filter media and reassemble.

Cause: High relief/regulator valve setting.

Remedy:

1. Adjust as indicated in vacuum level adjustment section.

PROBLEM: Pump will not run continuously.

Cause: Overheating. Thermal protection shutdown.

Remedy:

1. Check for adequate ventilation. The motor is air cooled and a ventilation fan may be required.

Cause: Circuit breaker tripping.

Remedy:

1. Check for incorrectly sized or defective circuit breaker.

Cause: Faulty relay.

Remedy:

1. Check for proper wire gauge size. Replace relay if contacts fail to remain closed.

Description	Part Number
Cover - Electrical Box	ECB80561
Bushing - 1" MPT x 3/4" FPT	PVC50992
Elbow - 1/4" MPT x 1/4" Poly-Flow Long	PCB50440
Elbow - Street 3/4" NPT PVC	PVC50642
Elbow - Street 1" NPT PVC	PVC51021
Filter - Relief Valve 3/4" FPT	SVA95818
Filter - Relief Valve 1" FPT	SVA95819
Fuse - 1/2 Amp	EMS10930
Fuse Holder	EMS10935
Gasket - Intake Manifold	MMS71167
Gauge - Vacuum	PGA70415
Jumper - 2 Terminal 115/230 VAC	ECC10225
Motor - 1 HP (60 Hz.)	HFM30905
Motor - 1 HP (50 Hz.)	HFM30915
Motor - 1 1/2 HP (60 Hz.)	HFM30910
Motor - 1 1/2 HP (50 Hz.)	HFM30920
Motor - 2 HP (50/60 Hz.)	HFM30911
Motor - 3 HP (60 Hz.)	HFM30912
Motor - 3 HP (50 Hz.)	HFM30925
Nipple - 3/4" MPT Close (Brass)	PCB50475
Nipple - 3/4" Close (PVC)	PVC50520

Description	Part Number
Nipple - 1" Close (PVC)	PVC51022
O-Ring - Pump Housing, 1 & 1.5 HP	MRP70955
O-Ring - Pump Housing, 2 & 3 HP	MRP70957
Relay - 24 VAC	ETR10460
Shock Mounts - Studded Rubber	MRP70965
Seals - Shaft Seal Assembly, 1 & 1.5 HP	SVA95845
Seals - Shaft Seal Assembly, 2 & 3 HP	SVA95847
Strainer - 3/4" FPT Vacuum Inlet	PVC50705
Dipos-A-Bowl	AVA60001
Strainer - 1" FPT Vacuum Inlet	PVC50706
Dispos-A-Bowl	AVA60011
Strainer - 1/4" FPT Water	PCB50960
Transformer - 115/230 Volt 24 VAC	ETR10500
Tubing - 3/4" PVC (19 mm)	PCT80460
Tubing - 1" PVC (25 mm)	PCT80461
Tubing - 1/4" Poly-Flow 135 PSI (6 mm)	PCT80610
Valve - 1/4" FPT Anti-Siphon	PVV50595
Valve - One Way 3/4" Check	PVV50657
Valve - Relief/Regulator 3/4" MPT	PVV85980
Valve - Solenoid 1/4" FPT 115 VAC	PVV10470
Valve - Solenoid 1/4" FPT 230 VAC	PVV10472

* To order parts, contact your authorized ADP Dealer.

Warranty Information:

- **Classic Bronze™ = 2 Year**
- **Gold Series™ = 2 Year**
- **UltraVac® = 3 Year**

All Apollo products are thoroughly inspected and tested in accordance with rigid specifications and standards. Our products are guaranteed against defective material and workmanship from the date of shipment; provided, that the installation, operation, and maintenance is done in accordance with Apollo's procedures as outlined in the provided manuals. **Warranty cards must be returned to Apollo within ten days of the installation to effect warranty.** No other warranties, or guarantees, expressed or implied are made.

Apollo's obligation under the warranty is to provide parts for the repair or, at Apollo's option, provide the replacement product, **excluding labor and shipping charges.** All special, incidental and/or consequential damages are excluded. Apollo will not issue credit for product without first attempting to correct the problem in the field. Written notice of breach of warranty must be provided to Apollo within the warranty period. The warranty does not cover damage resulting from the use of cleaning, disinfecting or sterilizing chemicals and processes. On vacuum products, the **warranty does not cover failures due to hard water deposits.** Failure to following installation and operation procedures will void the warranty.